Process, Configuration Server, Signalling Server,
Computer Program, and Storage Medium for
Generating Service Function Modules

Background of the Invention

5   The present invention relates to a process for generating
service function modules ~~according to the preamble of~~
~~Claim 1~~ and to a configuration server ~~according to the~~
~~preamble of Claim 8~~, a signalling server ~~according to the~~
~~preamble of Claim 9~~, a computer program ~~according to the~~
10   ~~preamble of Claim 10~~, and a storage medium ~~according to the~~
~~preamble of Claim 11~~.

The invention is based on the provision of
telecommunications service functions in a packet switching
15   data network, particularly in the Internet, wherein
multimedia communications connections between end
subscribers are established via the packet switching data
network. In simple cases, pure voice calls or pure video
calls are understood by the term " multimedia
20   communications connections" , whereas in more complicated
cases the term also means combinations of voice and video
as well as possibly additional data, e.g. computer files
etc. Pure voice calls via the Internet are also referred to
as Voice over Internet Protocol (VoIP) calls.

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ITU-T Recommendation H.323, issue 2/98, defines a possible
infrastructure for audiovisual and multimedia connections
via packet-oriented networks, referred to in the following
only as multimedia connections. Such an infrastructure is
30   also required i.a. for Voice over Internet Protocol
connections. Alternatives to an infrastructure according to
ITU-T Recommendation H.323 are discussed for example within
the IETF (Internet Engineering Task Force). The individual
components of an infrastructure for establishing
35   audiovisual and multimedia connections are, in the
terminology of ITU-T Recommendation H.323: terminals,
gateways and gatekeepers, also known as call servers.

Terminals provide access to a packet switching data network and comprise, as a core component, a voice codec with which voice signals are coded into digital data packets and digital data packets are decoded into voice signals.
5 Further codecs, for example video codecs for video signals, can likewise be contained in a terminal.

If a first terminal knows the Internet address of a second terminal, the first terminal can directly establish a
10 multimedia connection to this terminal with the aid of this Internet address. Normally, however, Internet addresses for terminals are not permanently assigned but are re-allocated in each Internet session, so that further components are used to establish a multimedia connection. These are the
15 so-called gatekeepers for establishing and maintaining connections within a packet switching data network, and the so-called gateways for connections to circuit-switched telecommunications networks. The gateways provide an interface function between a packet switching data network
20 and a circuit-switched telecommunications network, for example an ISDN (Integrated Services Digital Network). On the side of the circuit-switched telecommunications network, the gateway communicates for example using the CCITT Signalling System No. 7, while on the side of the
25 packet switching data network it communicates using signalling according to ITU-T Recommendation H.225, which for example describes the establishment and clearance of a connection within a packet switching data network. Additionally, a gateway converts different audio, video and
30 data formats in the respective networks where this is necessary.

Within a packet switching data network, gatekeepers make services for connection establishment and clearance and for
35 connection control available to the connected terminals. As already mentioned, on the one hand terminals can communicate with one another directly without a gatekeeper.

On the other hand, terminals advantageously can be
supported by a gatekeeper, for example during connection
establishment, in which case for example a terminal makes a
request to the gatekeeper for a connection to a

5 communications partner terminal. Then the gatekeeper
determines the required address of the communications
partner terminal and, using the signalling normally
employed in the packet switching data network, e.g.
signalling according to ITU-T Recommendation H.225

10 completes the desired connection to the communications
partner terminal.

A gatekeeper or gateway can also provide further functions,
e.g. service functions similar to the service-switching

15 functions or service-control functions within a so-called
Intelligent Network (IN = Intelligent Network, see for
example ITU-T Recommendation Q.1215) based on a circuit-
switched telecommunications network. A typical example of
such service functions of an Intelligent Network is the so-

20 called Call Completion on Busy Subscriber (= CCBS) service.
This service can be activated when a called subscriber is
busy. If the service is activated by the calling
subscriber, a service logic in the called subscriber's
exchange sends the calling subscriber's exchange a service

25 signalling message when the called subscriber is no longer
busy.

Service functions based on signalling messages can be made
available not only in a circuit-switched telecommunications
30 network, but also for a packet switching data network. For
this purpose, in a first configuration, service provision
devices of a circuit-switched telecommunications network
can be addressed from the packet switching data network.
However, in a further configuration, such services are
35 provided directly by servers of a packet switching data
network, e.g. by gateways or gatekeepers. The creation of
the service logics required for this purpose, i.e. the

procedures for transmitting and receiving service
signalling messages in the respective servers, is however
complicated and error-prone, as the procedures must first
be coded in a programming language and then be compiled to
5 form machine instructions executable by the servers.

Although, as already stated in the introduction, the
present invention is based on problems relating to a packet
switching data network, and in particular relating to the
10 Internet, it is not limited thereto. The described problems
are however of lesser significance in conventional
communications networks as solutions are already available
therein in the form of the Intelligent Network. However,
due to the different type of signalling, these solutions
15 can only be conditionally applied to packet switching data
networks. The solution presented in the following, which
was sought specifically for the Internet, can however also
be applied to other, conventional communications networks.

Summary of the Invention

20 The object of the invention is therefore to provide a
process and devices with which service function modules can
be reliably and easily created for the provision of service
functions for a communications network.

25 This object is achieved by a process according to the
technical teaching of Claim 1, and by a configuration
server according to the technical teaching of Claim 8, a
signalling server according to the technical teaching of
Claim 9, a computer program according to the technical
30 teaching of Claim 10, and a storage medium according to the
technical teaching of Claim 11.

The idea underlying the invention is that procedure modules
pre-produced on a configuration server are made available
35 in the form of program code sequences executable by a
signalling server and suitable for the transmission,
processing or reception of service-signalling messages by

the signalling server for the control of multimedia
communications connections via a packet switching data
network. The signalling server can for example be one of
the gateways or gatekeepers, also known as call servers,
5   referred to in the introduction. The service-signalling
messages serve to provide services for the terminals
mentioned in the introduction. The configuration server can
be a separate computer system or can be integrated in the
signalling server. The procedure modules are displayed in
10 the form of symbols, also known as icons, at a graphic user
interface of the configuration server and thus can be
easily manipulated by a user, e.g. by means of a computer
mouse. The user can select symbols and arrange them in a
manner corresponding to a flow sequence, requested by the
15 user, of a service logical function to be created. Here
flow sequence is to be understood in particular as the
transmission and reception of predetermined service-
signalling·messages in a sequence corresponding to the
service logical function. The configuration server then
20 detects the symbols at the user interface which have been
selected and arranged by the user and, in accordance with
this arrangement, from the procedure modules in each case
assigned to the selected symbols, assembles a service
function module which the configuration server then makes
25 available for loading into the signalling server. Following
the loading of the service function module, the signalling
server can then provide the service defined by the user,
and in particular can transmit and receive service-
signalling messages in the manner thus defined and thereby
30 provide a service configured by the user.

In an advantageous further development of the invention,
the configuration server also generates an interface module
which can detect parameter data for the service function
35 module. Such an interface module is for example loaded into
a network management server and enables the service
configured in accordance with the invention to be adapted

for example to local, customer-specific- or time conditions or simply to be activated or deactivated. The interface module can also run directly on the signalling server or on a personal computer connectible to the signalling server.

5 In addition to the structure of a packet switching data network according to ITU-T Recommendation H.323 explained in the introduction and the signalling normally used therein, the invention can also be applied to signalling in accordance with signalling protocols SIP and MGCP (SIP =

10 Session Initiation Protocol, MGCP = Media Gateway Control Protocol) discussed within the IETF (Internet Engineering Task Force) and the infrastructures on which they are in each case based. It is readily possible to apply the invention to further signalling protocols or packet

15 switching data network structures yet to be developed.

Further developments of the invention are disclosed in the sub-claims and the following description.

20 In the following the invention will be further explained with reference to the attached drawings in which:

Figure 1   illustrates a highly schematized arrangement for the implementation of the invention.

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Figure 2   illustrates a configuration server (SER) according to the invention for the implementation of the process according to the invention. The configuration server also

30   comprises a storage medium according to the invention in which a computer program according to the invention is stored.

Figure 3   illustrates the use of a configuration server

35   according to the invention in an Intelligent Network.

Figure 1 illustrates a highly schematized arrangement for the implementation of the invention. The procedure modules PM1, PM2, PM3, PM4, PM5, PM6 and PM7 are shown in the form of symbols, also known as icons, at a graphic user

5 interface UI run on a configuration server SER according to the invention which will be explained in detail with reference to Figure 2. Each of these symbols thus represents a procedure module for the detection, processing and formation of signalling messages of a packet switching

10 data network by a signalling server. Figure 1 also illustrates two fields OFFER and ORDER between which the procedure modules are distributed. The procedure modules PM1, PM3, PM54 and PM6 are shown in the field OFFER. These procedure modules are offered for selection by the

15 configuration server SER at the graphic user interface UI and can be manipulated by a user, for example by means of a computer mouse, through a so-called drag and drop operation illustrated in Figure 1 by an arrow SELECT. The user can thus "pull" symbols of procedure modules from the field

20 OFFER into the field ORDER and arrange them therein the desired manner. The procedure modules PM5, PM7 and PM2 have been selected and arranged by a user in this way. The configuration server SER then detects this arrangement of symbols and assembles the associated procedure modules in

25 accordance therewith, i.e. combines them to form a service function module whose individual components interact as shown in the field ORDER. In the service function module created as shown in Figure 1, the procedure module PM5 detects a service-signalling message for example. The

30 procedure module PM7 then processes the contents of the service-signalling message by entering these contents into a database and reading a correlated content from the database. Finally the procedure module PM2 forms a further service-signalling message from the content read from the

35 database.

Naturally the possibility can be provided that, in a drag

and drop operation, only a copy of the procedure module is pulled into the field ORDER while at the same time a further copy is left in the field OFFER.

5   This graphic user interface UI is based on a computer program with which, in accordance with the invention, a service function module can be generated, which is referred to here as generation module TL and is to be considered as a computer program according to the invention.

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A computer for the execution of this generation module TL is illustrated in Figure 2 in respect of some of its main components as configuration server SER. The configuration server SER can for example be part of a network management

15   system or a separate computer which can load a service function module, which it has generated, into a call server. The configuration server SER contains a control means CPU, e.g. a processor, for the execution of machine-readable commands, for example and here in particular for

20   the execution of the generation module TL. The configuration server SER also comprises a memory MEM in which the generation module TL can be stored. The configuration server SER also comprises, as input means, a keyboard KEY and a computer mouse (not shown separately)

25   for sending data to the generation module TL during the execution thereof and, as output means, a display device DIS for example for outputting data which have been generated by the generation module TL during the execution thereof. The configuration server SER also comprises an

30   interface device IF via which the configuration server SER can make a service function module available to a signalling server SSER. The components of the server SER are linked to one another by interconnections not shown in Figure 2. An operating system, e.g. UNIX or DOS (disc

35   operating system), manages the operating means of the server SER and controls i.a. the execution of the generation module TL.

A signalling server according to the invention differs from a configuration server according to the invention in that in a signalling server according to the invention the
5   functions of a conventional signalling server are combined with those of a configuration server according to the invention.

Following the generation of a new service function module,
10 this is made available in the configuration server, whereupon it can be used by a signalling server separate from the configuration server or combined therewith. For this purpose the generated service function module must of course be loaded into the signalling server or, if the
15 signalling server is at the same time a configuration server, activated therein. However this is not based on a principle specific to the invention.

A service to be provided and therefore to be made available
20 by the configuration server through the generation of a service function module must, as stated, generally be able to be adapted to local, customer-specific or time conditions or simply activated or deactivated. For this purpose, different parameters must then be preset by the
25 network management. For this event, in a further development of the invention it is provided that in association with the generation of a service function module, an interface module is also generated, by means of which the service function module can then be configured.
30 Having been loaded into a network management server, this interface module then has the task of firstly requesting an operator to input the parameters required for the newly generated service. Then this interface module has the task of sending these parameters to the signalling server(s) by
35 which the service is then to be provided.

Features yet to be defined for particular situations

include the specification of the relevant protocols to be
used. Apart from the possible provision of a multilingual
facility or self-adaptation facility, on the one hand fixed
settings and on the other hand entirely free variability
5   via the inputting of parameters are conceivable.

Even in the event of fixed settings, different protocols
can be used for signalling messages to be transmitted and
received.
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For example, a first procedure module contained in the
service function module can be provided for cooperation
with the public network, and for this purpose for the use
of signalling messages according to ITU-T-Recommendation
15 H.323, while another procedure module can be provided for
cooperation with the Internet, and for this purpose for the
use of SIP signalling messages or MGCP signalling messages.

Both for an interface module to be generated together with
20 a service function module and for the variations possibly
differing in respect of protocols, it is initially
conceivable for further procedure modules to be made
available for this purpose from the start and for these
then to be offered by means of different symbols at the
25 user interface in the OFFER area.

In general however, a quite specific set of parameters will
be used for a specific procedure module, this parameter set
being independent of precisely how this procedure module is
30 combined with other procedures to form a service function
module. Then each "service function module - procedure
module" can be assigned an "interface module - procedure
module", whereupon the two mutually assigned procedure
modules are combined under a common symbol at the user
35 interface UI. The compilation of the "interface module -
procedure modules" to form an interface module then can
also take place in association with the compilation of the

"service function module - procedure modules" to form a
service function module. It is immaterial to what extent
this then takes place automatically or upon command (e.g.
by means of a button on the user interface UI).

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Basically it is also conceivable for the different
procedure modules to be further adapted in respect of the
service to be newly created. For this purpose it is
conceivable to provide further input options, for example
10 after a double click on the associated symbol.

It is also effective for a configuration server according
to the invention to provide the option of creating new
procedure modules or of changing existing procedure modules
15 in order to be able to offer both new services and
cooperation with new types of network components. However,
an editor required for this purpose basically is not novel.

Finally the use of a configuration server according to the
20 invention is to be briefly described with reference to
Figure 3. As already mentioned in the foregoing, the
present invention was developed for use in the Internet.
However in the following it will be described for use in an
Intelligent Network for the additional explanation of this
25 possibility. However, it will be quite clear that an
Internet signalling server could be provided in place of
the Intelligent Network service control point SCP. The
service functions to be provided here are referred to as
functions of the Intelligent Network. It will also be quite
30 clear that when an Internet signalling server is provided
in place of the Intelligent Network service control point
SCP, this can be used both directly to configure services
for the Internet and via gateways to address a service
control point SCP of the Intelligent Network for the
35 configuration of services therein.

Figure 3 illustrates, one above another, a subscriber

terminal ISDN-TE, an exchange SSP, a signalling network node STP, and a service control point SCP. These are also interconnected in this sequence. In addition to the service control point SCP, which in the present description is also

5 referred to as signalling server, a configuration server SER according to the invention has also been shown. Service control point SCP and configuration server SER can also be combined as signalling server according to the invention.

10 The exchange SSP and the signalling network node STP here are also assigned interface units with a service switching function SSF.

The subscriber terminal ISDN-TE has been specified here by

15 way of example as a subscriber device corresponding to the ISDN standard. In principle any subscriber terminal, whether analogue or digital, whether for voice or for data or for both, can trigger functions of the Intelligent Network.

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The exchange SSP has been specified here as an exchange which can detect a service request of the Intelligent Network, i.e. as so-called service switching point SSP. Subscriber terminals not directly connected to an exchange

25 in the form of a SSP must firstly be switched to such an exchange by normal means.

The service switching function SSF integrated in the exchange SSP detects IN calls and forwards the enquiries to

30 the SCP. The requesting of an IN function is coupled to predefined triggers. Apart from specific subscriber numbers which represent a trigger point, specific connection states, such as busy subscriber, or in some situations even the lifting of the handset, are interpreted for example as

35 trigger point. The further actions can then be evaluated by the IN.

The signalling network node STP is simultaneously the service transfer point STP of the Intelligent Network and so-called signalling transfer point STP of the known signalling network SS7. At least in the latter form, it is generally known; in the signalling network it assumes the function of an exchange and a concentrator.

Signalling procedure No. 7 (SS7) is used between SSP and SCP, the ISUP protocol (ISUP = ISDN User Part) based on SS7 being used between SSP and STP, and the INAP protocol (INAP = Intelligent Network Application Part) likewise based on SS7 being used between STP and SCP.

The service control point SCP controls the enquiries of the SSPs, and thus ultimately the IN functions, in real time. Such service control points SCP are generally known and as such not covered by the present invention. The fact that such SCPs fulfil the tasks requested of them in cooperation not only with the STPs, the SSPs and the subscriber terminals but also in cooperation with configuration databases SMP (SMP = Service Management Point) or even with other network elements, is likewise known and forms part of the present invention only in that the invention also describes such further network elements.

Also with regard to the interface units with a service switching function SSF, it has been assumed that these are generally known or at least will be readily understood by the skilled person. The interface unit SSF linked to the SSP operates in relation to the useful-signal gateway device TG in the same way as the SSP itself operates in relation to a connected exchange without the function of a SSP. The interface unit SSF linked to the STP operates in relation to the signalling gateway device SG in the same way as the STP itself operates in relation to a further SSP.

The service control point SCP, which in the present description is also referred to as signalling server, is assigned a configuration server SER according to the invention. As already stated, service control point SCP and

5   configuration server SER can also be combined as a signalling server according to the invention.

Precisely in the last mentioned example, in which the configuration server according to the invention is used not

10   in association with a packet switching data network but directly in an Intelligent Network, it should be noted that the described structures often overlap in practice. Thus in practice the SSP or the STP also often performs the functions of the SCP. Therefore in such a case the

15   configuration server according to the invention is to be connected not to the SCP but to the SSP or the STP. It is exactly in such a case that the advantage of a configuration server according to the invention when used in a conventional communications network also manifests

20   itself. Although the structure shown in Figure 3 is not physically present here, it is however still present as a logical structure.

By means of this configuration server according to the

25   invention, new services to be provided by the service control point SCP can be configured and introduced into the service control point very easily in this way.